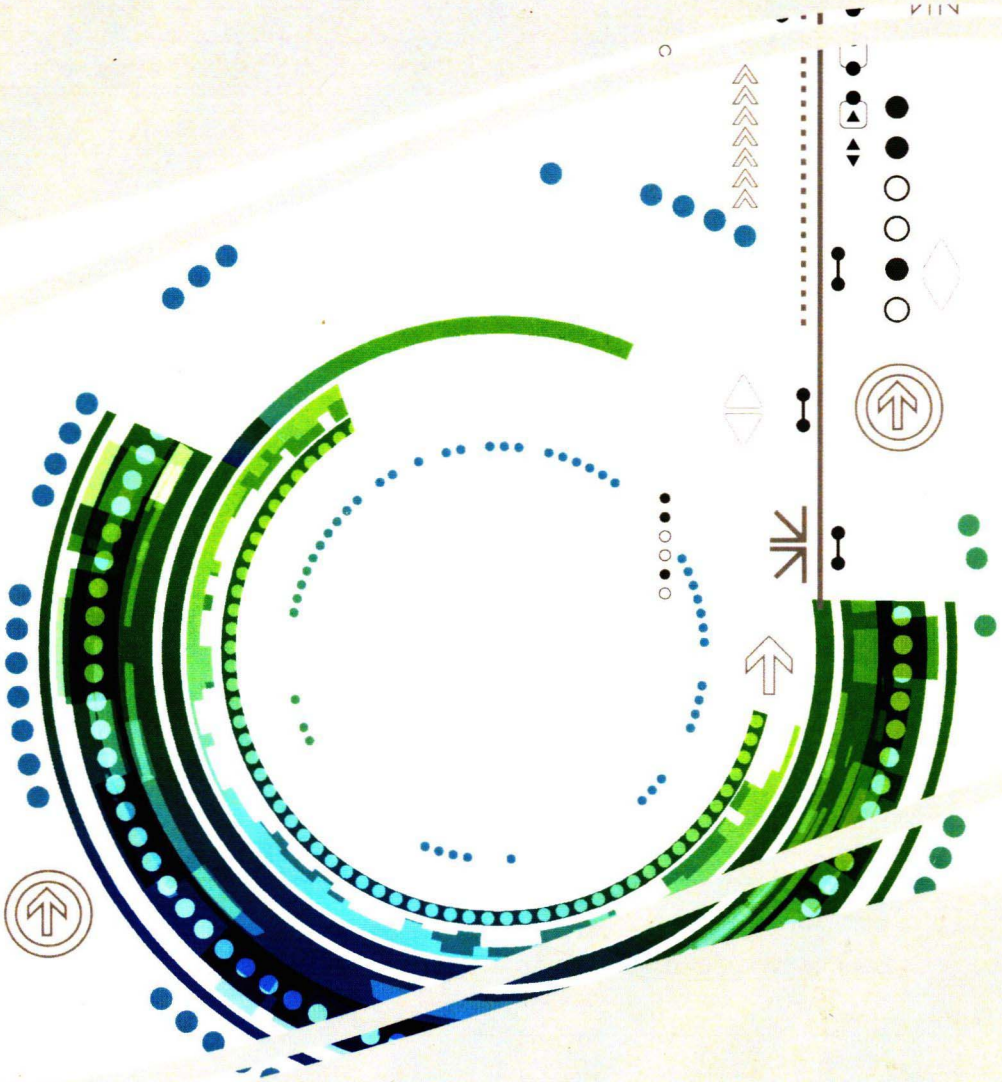
Handbook of Research on

Digital Media and Creative Technologies



Dew Harrison

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Handbook of Research on

Digital Media and Creative Technologies

Emerging technologies enable a wide variety of creative expression, from music and video to innovations in visual art. These aesthetics, when properly explored, can enable enhanced communication between all kinds of people and cultures.

The **Handbook of Research on Digital Media and Creative Technologies** considers the latest research in education, communication, and creative social expression using digital technologies. By exploring advances in art and culture across national and sociological borders, this handbook serves to provide artists, theorists, information communication specialists, and researchers with the tools they need to effectively disseminate their ideas across the digital plane.

Topics Covered:

- Animation
- Art and Technology
- Communication Technologies
- Computer Games
- Digital Self Identity
- Education in Creative Spaces
- Spatial Reasoning and Creative Design
- Urban Management
- Video Processing Technologies
- Virtual Reality

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Handbook of Research on Digital Media and Creative Technologies

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A volume in the Advances in Media, Entertainment, and the Arts (AMEA) Book Series

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MISSION

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Preface

The creative application of digital media and new technologies is accelerating as artists, designers, and technologists continue to experiment and explore ways to create new aesthetic fields, semantically enhanced communication, and innovative relations between people and machines. Our virtual worlds meet the real material world through the interdisciplinary research of computer scientists, digital media technologists, artists, designers, and digital culture theorists. This handbook is intended as a collection of seminal texts from a wide range of International researchers explicating ways of bringing the virtual to the real through differing conceptual positions and research approaches; the majority of chapters represent the most current research of the authors in that they are updated chapters furthering those research findings previously published in IGI Global books. The book aims to provide relevant theoretical frameworks, examples of innovative practice, and the latest cutting-edge research findings in this wide and inter-disciplinary area; it therefore includes four previously unpublished chapters which present new work within the research scope of the handbook. It is written for professionals who want to improve their understanding of the strategic role the creative use of digital media holds within culture and society and as such the handbook will be of value to technologists, academics, designers, interactive media experts, virtual world creators, and new media artists. The target audience of this book is composed of professionals and researchers working in the field of digital media, creative technology, and virtual worlds in various disciplines (e.g. design, information and communication sciences, digital artists, digital culture theorists, education, creative practitioners, computer science, and information technology). Moreover, the book provides insights and examples of creative practice employing new technologies in innovate and unusual ways to generate exciting new work and offer new pathways for digital media research and development.

The book is structured into three sections beginning with the artists' approach to innovative ways of using digital media and creative technologies, across the varied fields of practice and theory within art and design. The second group of chapters refers to research in pedagogy and the educational remit of new technological advances and platforms, while the third set of papers concerns creative communication and dissemination across digitally bound social media and global networks:

ARTISTIC PRACTICE AND THEORY

This section begins with Dr Denise Doyle's research, "Exploring Liminal Practices in Art, Technology, and Science." This chapter interrogates the notion of the liminal in relation to the virtual and the imaginary through a consideration of the field of art, science, and technology and current creative practices in virtual worlds and avatar-mediated space. In particular, the art project Meta-Dreamer (2009) is considered through the manifestation of the avatar as digital object. In its attempt to explore the experience of "living between worlds," it reflects the concerns of contemporary arts practice exploration of time and space relationships. The chapter is an updated version of "Living between Worlds: Imagination, Liminality, and Avatar-Mediated Presence" (2013). The ease in which we experience the liminal through virtual space is even more pronounced when the space is avatar-mediated creating an oscillating state of existence between the virtual and the physical. Yet, both consciousness and the imagination depend on this liminality of space.

Dr. Lorna Moore, an independent artist from the UK, then discusses her work "Be[ing] You: In[bodi] mental a Real-Time Body Swapping Video Performance." In this newly published chapter, she articulates the way two participants felt they were actually in the body of the other through real-time Head Mounted Display Systems. The chapter presents personal accounts of users' experiences of the work, which have been understood as an inter-corporeal experience. This phenomenon is explained through the lens of psychoanalyst, Jacques Lacan and his work on the "Mirror Stage" (Lacan, 1977), phenomenologist Maurice Merleau-Ponty and his writings on the Chiasm (Merleau-Ponty, 1968), and anthropologist Rane Willerslev's research on mimesis (Willerslev, 2007). These positions provide new insights into the relationship between the corporeal Self and the digital Other providing platforms to account for the blurred boundaries between these modalities. The chapter then discusses the way the material body is stretched across these divisions highlighting the way digital media is the catalyst in this in[bodied] experience of be[ing] in the world. The purpose of this work is to provide alternative ways of thinking about the body and its relationship to video performance to understand the way digital media is having an impact on our perception of a single bounded self and how selves can be shared through the technology. In[bodi] mental presents an alternative viewpoint of the self/other divisions and positions these modalities as a shared experience.

Prof. Ian Gwilt, Sheffield-Hallam University, UK, researches into 3D printing technologies presented in his chapter "Big Data – Small World: Materializing Digital Information for Discourse and Cognition." In an era where the visualization of complex digital information is increasingly being used to shape our social, political, and economic environments, this chapter examines what happens when you use big data to drive the parameters and form of a physical object. Building and reflecting on original research by the author, the chapter asks the questions, Why should we consider translating digital data into a physical form and What happens to how we understand, respond, and relate to digital information when it is presented in this way? Moreover, the discussion moves on to whether or not data-driven objects are simply a novel visualization technique or a useful tool that can be used to add insight and accessibly to the complex language of digital big data sets. The chapter then explores a number of the issues related to designing digital information "into" the material world. These issues can be divided into two broad areas of concern that highlight both the physical and philosophical interests involved in materialized big data. The chapter looks at the different ways in which we interact with objects using touch and our other senses, and considers what these types of embodied interaction might mean in terms of how we

comprehend any underlying data and information. It then concludes with a debate about digital material hybridity, distributed technologies, communities of use, and the implications for how we receive, understand, and consume big data.

Joan Truckenbrod is an artist and emeritus Professor at the School of the Art Institute of Chicago. In her chapter, "Digitizing the Physical: Physicalizing the Digital," she understands that radically shifting our experience of the visual image from virtual worlds, social media, electronic games, and flat screens to physical forms subverts the predominance of the digital realm. Living on the surface of the screen minimizes the tactility of materials and the resonance of memory and meaning embodied in objects. Digital 3D cinema, 3D television, and 3D cameras are precursors at the threshold of transforming digital into physical. The image flexes from screen to object with 3D printers and CNC machines. In the medical profession, computer 3D images from CT scans are transformed to remotely controlled, physical surgeries. Recently, thinking experiments use brain activity to remotely control robotic arms. Vehicles for physicalizing the digital will manifest three-dimensional, palpable, sensory, tactile, objectified experiences. Truckenbrod asks how will this phenomena transform modes of digital communication, physical interactions, and production on both the global and the personal scales? How will the material role of the computer prescribe new creative activities, new modes of artistic expression? Siting digital images and objects, digital images teeter in a precarious position between flat surfaces and material objects, between simulated three dimensionality and the physical world.

Dr. Alistair Payne, Head of Fine Art at the Glasgow School of Art, UK, is a painter and within his chapter, entitled "The Virtual, Alternate Spaces and the Affects upon Artwork," he explores the philosophical notion of The Virtual in response to the writings of Gilles Deleuze and unfolds this thinking through its interdisciplinary and transformative affects upon contemporary fine art. The Virtual will be discussed in relation to forms of contemporary painting; yet, the chapter provides a model for thinking through interdisciplinarity within, and from, other media. The Virtual acts as an instigator for change, which effectively destabilises the pre-formity attached to medium specific practices. It is for this reason that The Virtual forces external relationships and connections to come to the fore in order to radically alter and transform the physical and conceptual constructs of different disciplines. This updated chapter highlights these important ideas and presents new ways to consider The Virtual in relation to contemporary fine art practice, with a particular focus upon current issues in Painting. The chapter alongside the discussion of the virtual and its direct affects upon artistic practices encounters the hybrid and metamorphosis as key elements of change.

Ross Winning is an artist and lecturer in Animation from the University of Wolverhampton, UK, currently near completion of a practice-led PhD. In his chapter, "Sound Image and Resonant Animated Space: Beyond the Sonic Veil," he argues that animation is an art form that often encounters unpredictable, illogical, and imagined domains. In animated worlds, recorded sound is now part of a coalition of two sensory forms mediated through hearing and vision. Sound has therefore been embedded in the audio-visual toolbox since the successful synchronisation of sound and picture. Sonic elements now contribute significantly to how animators might shape their films and express ideas. These Animated worlds also often represent deeply rooted expressions of the interior mind of artists and animators. This updated chapter explores the relationship of sound to image in the evolutionary and increasingly variable animated forms that are currently proliferating. It focuses on sound as being the primary channel best able to reflect those interior ideas within a range of animated media. The exploration seeks to do this through tracing proto-cinematic ideas in art and animation practice that researches the sonified and animated image.

Suzette Worden's contribution, "The Earth Sciences and Creative Practice: Entering the Anthropocene," asserts that Artists who engage with the earth sciences have been able to explore all kinds of information about the natural environment, including information about the atmosphere, extremes of physical formations across immense dimensions of time and space, and increasingly "invisible" realms of materials at the nanoscale. This is a rich area for identifying the relationship between digital and material cultures as many artists working with this subject are crossing boundaries and testing out the liminal spaces between the virtual and the real. Not only is this a rich area for current experimentation but often these artists offer a critique of historical formations or provide a critique of theoretical concepts. To discuss these issues, this updated chapter provides an overview of theoretical links between visualisation and geology, mineralogy and crystallography. This chapter explores examples of creative practice through four themes:

1. Environment and experience,
2. Code and pattern,
3. Co-creation and participation, and
4. Mining heritage.

This thematic overview shows the diversity of creative work in this area. The chapter engages with practice and theory and takes a broad definition of the earth sciences to discuss virtual worlds and art practice. This includes a discussion of technologies that act upon the environment and also the visual technologies that allow us to "see" that environment and measure the world for scientific disciplines. Artists explore this as their subject and provide a critique of the associated science and technologies. In this context our understanding of materiality is extended.

Phillip Prager, University of Copenhagen, Maureen Thomas, Oxford University, and Marianne Selsjord present their research in a chapter entitled "Transposing, Transforming, and Transcending Tradition in Creative Digital Media" in which they ask: Can the range of aesthetics in computer-based interactive art be extended and enhanced through an understanding and deployment of pre-literate oral composition and storytelling techniques alongside medieval and renaissance approaches to form, colour, texture, line, and light in drawing, painting, and sculpture? How does the use of games and information technologies in conjunction with traditional visual and storytelling arts and crafts help today's media artists devise rich and complex interactive moving image artworks? Illustrated by case studies, this chapter addresses the theoretical framework surrounding such production and offers conclusions on the creative potentials and practical implications of these approaches for today's media artists. Marianne Selsjord (National Academy of the Arts, Oslo) contributed to the previously published chapter "Museum or Mausoleum? Electronic Shock Therapy" with Maureen Thomas and Robert Zimmer (Goldsmiths University of London), which inspired the current chapter, sadly developed multiple myeloma (an aggressive bone marrow cancer) in 2012. She was still working on her own artistic material until she was admitted to hospital just before Easter 2014, where she died peacefully ten days later. Marianne had written a draft and notes for the chapter printed here, and Maureen edited these and supplied missing references, so that they were able to represent Marianne's most recent and final piece of original 3D art, and to include her reflections on the relationship between traditional techniques and creative digital media.

Garfield Benjamin, a doctoral candidate from the University of Wolverhampton, UK, contributes a new chapter entitled "'Virtual Reality' Reconsidered" positioning the subject as the gap between virtual and real states. Within the many varied, and often incongruous, theories of digital technology and its

culture there are two strands of the discussion that have emerged in which the very terms of the field are challenged. These are centred on the problematic notion of "virtual reality" that has dominated cultural depictions of the digital world, usually taking either "virtual" or "real" in an expanded definition to draw out a deeper understanding of the fundamental differences, connections, and interdependency between physical and digital spaces. Digital media has called into question the appearance of "reality," forcing all theories of contemporary culture to take into account the possibility of other spaces with which the (physical) human subject can engage. There is a need to expand and intersect current discussions of the relation between virtual and real by exploring the antagonisms that arise through developing both sides of the term. This chapter will therefore readdress the term "virtual reality" in the context of ongoing debates in philosophy, technology, and creative practice in a discussion of subjectivity in contemporary digital society, to insist on a constant re-evaluation of the terms used in such a discussion and their ramifications for its application in digital media and creative technologies.

Everardo Reyes-Garcia from the University of Paris contributes "Designing Pervasive Virtual Worlds." In an earlier chapter, written in 2009, he suggested that we made the following assumptions regarding pervasive virtual worlds: pervasiveness is about being here and now in several places simultaneously. People are surrounded by computing artifacts. Each one of these devices might have a different graphical interface or maybe there are differences at the level of graphic design but they share similar functions. While we are physically in some place, we can be acting in a remote place. Accordingly, while we act in that remote place, we can do similar tasks as those in the physical space. The pervasive property of digital media has raised a world that is mixed, extended and mediated through media. In this world, the society has developed contemporary processes that rely on a virtualization of individuals. Digital media and digital objects may be designed to communicate an operational function of the system, but at the same time, they communicate an allegory of the system, the world, and the society of media. In a society of media, the world is constituted by the hyperspace created by digital media and human uses. Virtual worlds do not have to represent reality exclusively in a realistic fashion.

EDUCATION

In this second section, Paul Chilsen from Carthage College, USA, presents "Making It for the Screen: Creating Digital Media Literacy." With the tectonic media shift in which we find ourselves, the lines we think we know, and think we can count on, seem to be blurring. The myriad machinations and goings on in our convergent media world, while a fascinating and rich topic, understandably extend beyond the scope of this chapter. Rather the focus here is to look more at what we are doing now. Now that the explosive growth and pervasive penetration of new media is upon us, are we doing the best that we can to get a firmer grip on the reins? The wave of buying and handing out expensive devices designed to merely access the conversation continues to grow and swell, threatening to eat up shrinking resources. In light of that, what steps can be taken to move beyond the latest techno-wizardry and instead convey real skills that allow more people to effectively join in, to make clear meaning, and to affect the change they seek? This ever-expanding world of screen-based electronic media encompasses such an understandably and incredibly broad array of media types, paradigms, and histories that even finding a name or term to refer to it all can prove difficult. Under the auspices of the Rosebud Institute we have used the term broader term 'digital media' as well as the more specific screen media. These terms work somewhat interchangeably to describe media specifically produced, created for, and unfolding on the screen yet are

general enough to encompass a broad array of different media, both moving (film, video, television, and gaming) as well as those which are generally more static (websites, social media, blogs). The updated chapter has a necessarily refined scope. It looks at a very practical and doable approach that is giving people a baseline way to become more active and informed members of a screen media world.

Michelle Aebersold and Dana Tschannen from the University of Michigan, USA, present their current research in "Using Virtual Environments to Achieve Learner Outcomes in Interprofessional Healthcare Education." The purpose of the original chapter was to highlight a new simulation teaching strategy to teach interpersonal and clinical judgment skills to healthcare practitioners. The updated chapter uses this approach to focus on similar skills with the focus being on IPE. The area of IPE is a national focus area and institutions globally are struggling with how best to implement this type of education. The chapter provides a method that is not well utilized and offers options that can meet the core competencies of IPE. More specifically, it includes an overview of the need for IPE and impact on patient safety and information on Second Life (SL), its benefits and uses in IPE. The authors have continued their work in the area of SL and have improved methods for addressing technical challenges, streamlined orientations methods and materials, and developed specific methods for evaluating learner outcomes. The chapter then updates the five-step process for developing virtual simulations using an IPE exemplar. Virtual reality programs, such as Second Life, can provide a representative training environment for students at a lower cost and similar experiences to those of mannequin based simulations for selected educational objectives. It also can provide greater opportunity for IPE as all students do not need to be in the same location at one time.

Kathy Sanford, University of Victoria, Canada, Elizabeth Merkel, and Timothy F. Hopper contribute "Digital Media in the Classroom: Emergent Perspectives for 21st Century Learners." In the fall of 2006, the authors' ethnographic research study began in a response to increasing social concern regarding adolescent (dis)engagement in school literacy practices. They began data collection in a grade 9/10 Information Technology (IT) class wherein students were in the process of creating their own videogames as a way to learn programming. The work with these initial participants spurred the proliferation of several strands of subsequent research, and only inspired more questions about the ways in which youth are immersed in gaming and programming. Through their work with the grade 9/10 class, they began to understand videogames as having the potential for immersive, emergent learning where relationships can develop to become more fluid, organic interconnections where the students and teacher are both learning and guiding each other. Their theoretical perspectives shifted to frame our research. The initial work with the IT class was the impetus from which a longitudinal study began, investigating ongoing engagement with videogames by a core group of students. In 2014, this study continues to morph as said participants are now in university and in the work force and currently conduct study groups as our "in-house expert" research assistants.

D. Craig Schroeder with Carl W. Lee and Margaret J. Mohr-Schroeder from the University of Kentucky contribute "Using Spatial Reasoning for Creative Design: Merging Engineering and Mathematics Practices." The purpose of this updated chapter is to provide a rich example of developing spatial reasoning in middle school students, especially the 2- and 3-dimensional relationship, through the use of SketchUp in a real world context. This chapter provides detailed information regarding the implementation of SketchUp into a middle grades classroom, including directions and challenges to help guide students to increasing their spatial reasoning, especially between 2- and 3-dimensional objects. The chapter highlights a culminating project in which the students use their reasoning abilities to create a 3-dimensional project employing the NGSS Engineering Practices (National Research Council, 2011).

In conjunction with the current administration at an urban upper south middle school, students will be asked to develop a 3-dimensional computer model of their ideal school renovation (the school is in the planning stages of an actual renovation). The purpose of the project is to develop spatial reasoning and engineering skills within the students through the use of 3-dimensional software. Students will need to use the iterative process of design, build, test, redesign in order to develop a renovation that enhances the current school and provides an enhanced learning environment for future students.

Sanja Tatalović Vorkapić and Elma Polanec, University of Rijeka, offer a new chapter concerning "An Empirical Study about the Use of the Internet and Computer Games among Croatian Children." The existing digital age inflicts new situations and requirements upon children, parents, and experts for the purpose of educational work. It is therefore essential that we implement systematic and continuous empirical research if we are to adapt to the modern world and maximize the preservation of the psychological health of children, while allowing them a happy childhood. The development and reach of contemporary media has extended to where its content can have a significant influence on its receivers, especially where children are concerned as they are the most sensitive part of population. Children spend 3-4 hours daily watching TV and other media, or most of their free time (Ilišin, Marinovic Bobinac, & Radin, 2001). Inter alia, use of Internet and computer games is important in their lives. Child's free time is increasingly devoted to playing different games on the computer, allowing for less activity in the fresh air, running on the lawn, playing at being game hunters, seeking the fruits that nature gives us, etc. Educational experts know very well that imaginary play and game is very important in children lives. The game is not only pleasure and spontaneous activity but significantly contributes to psychological development of child (Verenikina, Haris, & Lysaght, 2003). But when it comes to children's play and its impact on the psychological development of children, what place is occupied by computer games? Computer games do not mean by spontaneous activity, do not mean interaction face to face, and children do not create game by themselves. Someone else has created a game for them; they are just in the function of implementer of a game.

COMMUNICATION AND INNOVATION

In the third section of the handbook, Joshua Fairchild from Pennsylvania State University, with co-authors Rachel Heinen, Salvatore Leone, Lily Cushenbery, and Samuel Hunter present their updated chapter on "Tools for the Process: Technology to Support Creativity and Innovation." Increasingly, organizations are turning to emerging technologies as tools to enhance innovation. However, such technologies often develop and change faster than research on best practices can keep up. In particular, the ubiquity of social media platforms, smart phones, and tablet computers stands to exert a massive impact on how organizations engage in creative endeavors. However, to date, there has been little research examining how such digital media technologies influence the creative process. In the chapter, the authors intend to investigate this issue by integrating scholarly work on the creative process and organizational behavior with an evaluation of such emerging technologies. It is their goal that this review and synthesis will lay the groundwork for future empirical work and also provide actionable recommendations for organizations seeking to use digital technologies to enhance innovation.

François Allard-Huver and Nicholas Gilewicz, Sorbonne University, contribute "Digital *Parrhesia* 2.0: Moving beyond Deceptive Communications Strategies in the Digital World." In their previously published chapter, the authors aimed at analyzing how Astroturfing—fake grassroots communications